Improving TELRIC-based UNE Pricing

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1. OVERVIEW

This report is submitted in response to the Commission's NPRM inviting comments on the Commission's rules regarding pricing of Unbundled Network Elements (UNEs).[2]

Beginning with the Commission's 1996 Local Competition Order[3] the Commission has set out a comprehensive, detailed methodology for determining forward-looking economic costs of UNEs and for pricing UNEs in accordance with estimates of those costs. The Commission's TELRIC (Total Element Long-Run Incremental Cost) methodology has been applied in state regulatory proceedings to establish the prices of individual network elements and bundles of elements. Implementation of the TELRIC methodology has occurred through the construction and estimation of a number of cost-proxy models developed by incumbents, entrants, and the FCC staff, which have informed the extensive pricing proceedings and rulings of the individual commissions.[4]

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[2] *In the Matter of Review of the Commission's Rules Regarding the Pricing of Unbundled Network Elements and the Resale of Service by Incumbent Local Exchange Carriers*. WC Docket No. 03-173, Notice of Proposed Rulemaking, FCC 03-224 (September 15, 2003) ("*NPRM*").

[3] FCC, *Implementation of the Local Competition Provisions in the Telecommunications Act of 1996*, CC Docket No. 96-98, First Report and Order, 11 FCC Rcd 15499 (1996) ("*Local Competition Order*").

[4] The principal cost-proxy models include the FCC's Synthesis Model (earlier called the Hybrid Cost Proxy Model), the Benchmark Cost Proxy Model, and the HAI Model.

In these comments I respond to the Commission's request for an improved approach to the current UNE pricing regime, one that bases UNE prices on a cost inquiry more firmly rooted in the real-world attributes of existing networks and is at the same time more theoretically sound.[5]

The Commission's TELRIC methodology for pricing UNEs has the appropriate goals of sending signals for efficient entry and investment to all competitors while providing ILECs with the opportunity to recover the efficiently incurred forward-looking costs of those elements. However, the Commission's methodology does not recognize that UNE prices will be recalculated periodically as market participants and regulators react to changing costs of constructing and operating UNE facilities over time. Furthermore, the cost-proxy models that implement the methodology make hypothetical, simplifying assumptions about network topography and cable routing that fail to account for real-world aspects of local network investment.

To achieve efficient pricing, the Commission's TELRIC methodology needs to be modified to account for periodic re-pricing of UNEs and real-world aspects of UNE investments. Utilization rates should take into account growth in demand and options to efficiently expand UNE capacity during the lifetime of assets. Information on actual locations of consumers, cable routing and service area topography should be incorporated into cost modeling.

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[5] NPRM, para. 4.

I also comment briefly on several other issues raised in the Commission's NPRM. The cost of capital to an efficient carrier varies with the risk of recovering its investment; the stranded investment risk is lower for most narrowband local loops than for other UNEs and consequently should be evaluated with a lower cost of capital. Loop conditioning costs would not be incurred in a network with best-practice technology and should not be included in either recurring or non-recurring UNE prices. The efficient pricing of the non-recurring activities of initiating and provisioning UNEs is not affected by the dynamic evaluation of forward-looking costs recommended here. Forward-looking costs can vary widely across service areas and to avoid creating incentives for inefficient investment UNE rates should not be averaged across zones with diverse costs.

2. EVALUATION OF THE COMMISSION'S TELRIC PRICING METHODOLOGY

The Commission, in establishing a pricing regime for UNEs, stated two objectives:

- First, that prices should send signals for efficient entry and investment to all competitors.
- Second, that the prices of UNEs should provide the ILECs that supply the UNEs an opportunity to recover the efficiently incurred forward-looking costs of those elements.

These goals, provided they are understood and interpreted as compatible with maximizing economic welfare, remain appropriate guidance for public policy regarding UNEs.

GENERAL DESIRABILITY OF TELRIC

The Commission's TELRIC methodology for determining forward-looking economic costs of UNEs is an approach that, when suitably modified, can provide a sound basis for pricing UNEs.

- The TELRIC methodology establishes economic efficiency as the principle on which costs of investment and operation of a network should be determined. It states that forward-looking costs of the best-practice technology, rather than historical costs or opportunity costs, should be the basis of efficient pricing of UNEs. Entrants to the local telecommunications markets will rationally compare the forward-looking costs of constructing their own facilities with the prices established for UNEs, and efficient investment decisions will be encouraged when the UNE prices themselves are based on the forward-looking costs of incumbents.
- The TELRIC estimates of the ILEC's efficient cost of leasing a UNE are based on constructing and operating the individual network element with sufficient capacity to serve the total demand for the network element, rather than to serve just the incremental quantity of services of the element used by one entrant. Network

elements may benefit from economies of scale. The TELRIC methodology ensures that these benefits flow to both the ILEC and CLEC in proportion to their uses of the elements.

- The TELRIC of a UNE is an estimate of the long-run costs for adding a particular network element as an increment to the rest of the ILEC's network. A long-run cost methodology, in which all resources are variable, is appropriate for encouraging efficient decisions by entrants who would compare the price of leasing a UNE from an incumbent with the cost of a long-term commitment of resources invested in equivalent facilities.
- By making the network element, rather than a network service, the unit of analysis for developing efficient costs the TELRIC methodology minimizes the difficulty of estimating costs common to several services and then allocating those costs efficiently.

THE EFFICIENCY STANDARD AND INVESTMENT

Investment provides many of the essential resources necessary to supply telecommunications services, and increased investment, if efficiently undertaken, will enlarge the supply of services. However, it would be misguided to establish as a goal of public policy simply the promotion of a greater level of investment in the local telecommunications sector.

How much investment in local telecommunications is desirable? Commission policy should encourage that amount of investment that makes the best use of scarce resources. In a given situation, the capacity and services provided by existing facilities may be insufficient, in which case increased investment would create benefits to consumers and firms that exceed the value of the additional resources used. Conversely, in different circumstances additional investment may be excessive, creating excess capacity or additional features that have only

limited incremental value compared to the value obtained by using the resources elsewhere in the economy.

The appropriate efficiency standard for developing and assessing UNE prices is to set UNE prices so as to encourage the amount and timing of investment in the local telecommunications market that maximizes economic welfare. The standard of a competitive market provides the appropriate guidance. If competitive firms, operating efficiently, invest resources in telecommunications until the returns on those investments are equal to the competitive return on other investments in the economy then the level of investment is efficient.

UNE prices that encourage the amount and timing of investment in the local telecommunications market that maximizes economic welfare will be consistent with the objective of providing an efficient incumbent with the opportunity to recover its forward-looking costs of supplying UNEs. An incumbent will evaluate new investment in a network element on a forward-looking basis, taking into account prices, operating costs, and technology over the lifetime of the investment. UNE prices based on these factors and a competitive rate of return will enable an efficient incumbent to recover its costs over that period.

THE NEED FOR PERIODIC PRICE REVIEW

The Commission's TELRIC methodology determines the TELRIC price of an asset by calculating a constant ("levelized") price that, over the life of the asset, is just sufficient to yield revenue equal, in present value, to the initial investment cost, plus a return on that investment at the firm's cost of capital, plus the present value of all operating costs. This price calculation

'mimics' the constant price that would be necessary to induce an efficient competitive firm, with the same revenue and cost characteristics, to invest in such an asset.[6]

However, the Commission's methodology does not provide for periodic review of forward-looking costs and UNE prices. Although firms will incorporate their expectations of future investment costs in the decisions they take today to invest resources in UNE facilities, the actual future costs of equivalent facilities will undoubtedly diverge to some degree from those expectations. In the future, similar investment decisions taken by incumbents and CLECs at a future date will be made on the costs that actually prevail at that time. To encourage efficient investment and entry decisions in the future, future prices should reflect that additional information.

If the initially established UNE price remains unchanged in the face of altered investment costs in the future then that price will not promote an efficient level of investment.[7] If future UNE investment costs are expected to be lower than current costs and that expectation is incorporated into the current UNE price, then CLECs may rationally choose to purchase UNEs today. Later, with lower costs of their own facilities, CLECs will reduce their use of UNEs and invest in their own network facilities. In this case, the ILEC, facing either reduced demand for UNEs or the need to reduce the UNE price to retain demand, will be unable to earn

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[6] For simplicity, this discussion assumes that there are no common costs linking the UNE to other components of the network. If common costs are present, the UNE price will, in addition, include an allocation of those costs to the TELRIC of the UNE.

[7] D. Mandy, "TELRIC Pricing with Vintage Capital," J. of Regulatory Econ., 22:3 (2002.), 215-249; G. Biglaiser and M. Riordan, "Dynamics of Price Regulation," Rand J. of Econ., 31:4 (2000),744-67.

the rate of return on its cost of capital that was assumed in the static TELRIC price calculation.[8] Consequently, the ILEC will not have the incentive to undertake the initial investment, but if, nevertheless, it were to do so, it would not earn its cost of capital.

Conversely, if expected future investment costs exceed current costs, due to inflation or increases in other cost factors, then CLECs will have incentives to invest now. But as costs rise and the initially established UNE price remains unchanged, a CLEC will shift from expanding its own facilities to using UNEs, which will then be priced below current investment costs, even if it were efficient for the CLEC to continue to invest.

The Commission's levelized UNE pricing methodology fails to recognize that the investment cost of a new asset will likely change over time and consequently that regulators will be likely to recalculate TELRIC prices at periodic intervals during the lifetime of the asset to reflect these changed costs. When TELRIC prices of UNEs are periodically reviewed and recalculated, the UNE prices will not remain constant over the life of the asset, but only until the next pricing review period, at which time they will be reset to reflect the new circumstances.

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[8] M. A. Crew and P. R. Kleindorfer, "Economic Depreciation and the Regulated Firm under Competition and Technological Change," J. of Regulatory Econ., 4 (1992), 51-61.

3. THE APPROPRIATE USE OF REAL-WORLD INVESTMENT INFORMATION IN EFFICIENT PRICING

INCUMBENT'S HISTORIC INVESTMENT IS NOT FULLY EFFICIENT

The current local network assets of the ILEC are a composite of investment decisions, taken over many years that combine different generations of technology. During the period when the longest-lived assets were acquired, the incentives of many ILECs to invest were significantly affected by rate-of-return regulation. Incumbents were able to select technologies, capacity levels, and network configurations to increase total returns beyond the level that efficiently minimized total costs.[9]

More recently, ILECs have been subject to incentive regulation, both by the Commission and many states, in the form of price caps and related mechanisms that encourage more efficient investment choices. However, these incentive mechanisms have not yet been in effect long enough that inefficiently incurred long-lived assets, including loops and structures, have been fully replaced with efficiently selected network designs and technology.

TELRIC pricing should not be based on an ILEC's historic investments in long-lived assets. To use historic investment costs as a basis for UNE pricing would overstate the costs of an efficient operator.

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[9] H. Averch and L. Johnson, "Behavior of the Firm under Regulatory Constraint," Amer. Econ. Rev., 52 (1962) 1052-1069; D. E. M. Sappington, "Price Regulation" in *Handbook of Telecommunications Economics* Vol. 1, M. E. Cave, S. K. Majumdar and I. Vogelsang, eds., Elsevier, Amsterdam, 2002.

ATTRIBUTES OF ILEC INVESTMENT DECISIONS SHOULD INFORM EFFICIENT PRICES

Nevertheless, TELRIC methodology for efficient pricing of UNEs can appropriately take into consideration some attributes of the ILEC's actual network. Two aspects of the real-world experience of ILEC network investment decision-makers and engineers are relevant.

- In an actual network the routing of cables must take into account the conditions of topography in local markets. The locations of individual consumers and the lengths and configurations of ILECs' cable layouts provide a real-world basis for distinguishing highly local cost factors in different service areas. This information, provided it is available in verifiable sources, can increase the reliability of TELRIC estimates for loop and transport UNEs.
- In a dynamic TELRIC methodology, efficient investment decisions will take into account the capacity provided by existing network assets. Long-run cost minimization will include evaluating the option of using available capacity. The efficient investment profile may then result in a different sequence of investments and a lower UNE price than the price calculated from a static TELRIC analysis that assumes that the network consists of entirely new investment.[10]

[10] D. M. Mandy and W. W. Sharkey, "Dynamic Pricing and Investment from Static Proxy Models," FCC, OSP Working Paper 40, September 2003, pp. 36-43.

4. ASSET UTILIZATION AND CAPACITY ADDITIONS

Efficient investment in long-lived assets must take into account both changes in demand over the lifetime of an asset and economies of scale in the asset's capacity. However, the Commission's TELRIC methodology does not account for the effects of these dynamic factors on the costs of an efficient firm. The static TELRIC methodology falls short in two ways:

- First, the TELRIC methodology assumes that each asset is used at a constant rate of utilization throughout its lifetime.
- Second, the methodology assumes that the capacity of the asset is large enough to serve the maximum demand encountered during its lifetime.

VARIABLE UTILIZATION RATES

If demand is growing, an efficient firm will, when making current investment decisions, take into account the need to have increased capacity available in the future. If there are economies of scale in assets – which may result in part from fixed costs of engineering and constructing facilities –the firm can minimize the discounted value of total costs of serving current and future demand by investing in assets that provide more capacity than is required to serve the initial demand. In this case, some amount of capacity will initially be idle and utilization rates will increase as the asset ages.

However, the TELRIC prices that are calculated by cost proxy models, such as the FCC's Synthesis Model, assume a constant utilization rate for each asset and do not anticipate that utilization will change over the life of the asset. A dynamic analysis of utilization, using theoretical parameter values representative of local loop investment and growing demand,

suggests that TELRIC prices should be reduced at least 5% below the dynamically-efficient prices obtained assuming a constant utilization rate.[11]

CAPACITY ADDITIONS DURING ASSET LIFETIME

TELRIC cost-proxy models have adopted engineering rules that are used by the ILECs to establish "fill factors" (utilization rates) in their network planning. For example, in designing the distribution plant, ILEC rules call for sizing structures and cables in order to meet the greatest expected demand in the area during the life of the plant.[12] Such capacity-sizing rules, however, do not exploit the option of investing in capacity expansion during the lifetime of the original asset. Instead of installing cable plant with enough capacity to serve demand 30 years in the future, the present value of total costs may be reduced by initially constructing a smaller cable plant and subsequently reinforcing that investment some 10, 15 or 20 years later. A theoretical calculation, using parameter values representative of loop investment, finds that optimal capacity expansion increases the average utilization of loop plant by more than 23%.[13]

As compared with an efficient firm, the ILECs' investment rules and the Commission's TELRIC methodology use utilization rates that are inefficiently low. As a result, TELRIC costs are calculated for a greater investment in capacity than is efficient, and TELRIC prices are inefficiently high. Calculations that use dynamically efficient fill factors and exploit

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[11] Mandy and Sharkey, pp. 21, 25.

[12] Telcordia Technologies, "Telcordia Notes on the Networks," Special Report SR-2275, Issue 4, October 2000, p. 12-2. In addition to capacity reserved for future growth, a minimum level of excess capacity is required for "administrative fill" to efficiently handle customer mobility and outages and maintenance needs.

[13] Mandy and Sharkey, pp. 18, 35.

opportunities to expand capacity during the lifetime of assets will lower the efficient price of local loops.

5. COMMENTS ON OTHER MATTERS

COST OF CAPITAL

The cost of capital to an efficient carrier varies with the risk of not fully recovering an investment. This risk, as the Commission has recognized in its TELRIC methodology to date, is appropriately included in the cost of capital used to estimate efficient costs.[14] For an ILEC, there is a potential risk of stranded investment (or reduced utilization of investment) in a network element due to the loss of customers to a facilities-based entrant, a risk that varies with the type of UNE.

In much of the local loop plant that serves all but the large-enterprise customers, the ILEC's loop investment provides sunk-cost and fixed-cost advantages over entrants, as the Commission has recognized.[15] With the entry barriers posed by high sunk and fixed costs of loops, entrants will rationally choose to lease loops from the ILEC at efficient prices rather than invest in duplicate facilities in which they face a risk of loss. In these circumstances the ILEC that has efficiently invested in loop plant has a minimal risk of stranded investment, and the Commission has found that CLECs have not deployed their own copper loop facilities.[16] Where an ILEC has efficiently invested in loop plant that integrates broadband and narrowband

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[14] Local Competition Order, para. 702.

[15] FCC, *Review of the Section 251 Unbundling Obligations of Incumbent Local Exchange Carriers, Report and Order and Order on Remand*, CC Docket No. 01-336, FCC 03-36 (August 21, 2003), paras. 205, 237 ("*Triennial Review Order*").

[16] Triennial Review Order, para. 225.

services, any greater riskiness associated with the broadband capabilities that results in a higher cost of capital should be allocated solely to the broadband components of the network.

For some other network elements, such as switching, vertical services and database services, sunk costs and fixed costs pose lower barriers to competitive entry. CLEC facilities-based entry could in some cases reduce the growth in demand for, and utilization of, those elements, indicating some greater risk to the recovery of ILEC investment undertaken on the assumption of high growth in demand and utilization.

To properly reflect the dissimilar investment risks for different UNEs faced by the ILEC, the cost of capital used to evaluate efficient investment in narrowband loops should be lower than ILEC's average cost of capital in a TELRIC analysis and lower than the average cost of capital for other UNEs. A lower cost of capital for loop facilities will reduce the efficient UNE loop price as compared with current TELRIC model estimates, which apply a uniform cost of capital for all UNEs.

LOOP CONDITIONING COSTS

In many markets the local loop of the ILEC's network contains loading coils, bridge taps and other impairments that prevent individual loops from achieving the technical quality of service that is equivalent to current best-practice. Entrants purchasing UNE loops are entitled to

loops that meet best-practice standards,[17] and in those cases the ILEC may incur costs of conditioning some lines.

Loop conditioning costs are a one-time ILEC capital cost that is required to update a legacy distribution technology to the standards of current best practice. A carrier constructing a distribution network today would not install substandard loops. As such, these loop-conditioning costs are not forward-looking costs of an efficient network operator. They would not be incurred by an efficient entrant and should not be included in calculating the forward-looking cost of the distribution plant and the efficient UNE loop price.

NON-RECURRING CHARGES

Some activities of initiating and provisioning UNEs are necessary to make a UNE in an efficient network available for a specific leasing carrier. An entrant who supplied its network elements to another carrier would incur similar one-time costs. As with the investment and operating costs of the UNEs, charges for non-recurring costs of initiating and provisioning UNEs should be based on forward-looking costs of these activities, efficiently carried out by best-practice procedures and technology. Estimates of these costs, which are incurred today for UNEs supplied today, do not need to be modified to account for changes in future one-time initiating and provisioning costs. Modification of TELRIC methodology to account for dynamic

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[17] FCC, *Implementation of the Local Competition Provisions of the Telecommunications Act of 1996*, CC Docket No. 96-98, Third Report and Order, 15 FCC Rcd at 3775, para. 172 ("*UNE Remand Order*").

investment decisions will not affect the efficient pricing of one-time initiating and provisioning activities.

DISAGGREGATED UNE RATES

The Commission's UNE pricing methodology recognizes that loop costs vary by subscriber density and topography and provides for geographically deaveraging rates into at least three cost-based rate zones.[18] Estimates obtained from the TELRIC cost-proxy models establish that subscriber density is perhaps the single most important cause of cost variation between local service areas.

In order for UNE prices to provide efficient signals of investment costs, prices should vary by subscriber density and service area topography. If rates are not differentiated by zones in which these factors are substantially different, and are instead averaged across areas with differing costs, investment incentives will be distorted. In the low-cost areas competitors will have incentives to construct facilities rather than to lease UNEs at the averaged price. In high-cost areas, entrants will tend to lease UNEs rather than construct their own facilities at generally higher costs.

In some local markets, as a result of state regulation, retail rates for local telephone service include implicit support flows ("subsidies"). Also, rates of higher-cost and lower-cost consumers or areas may be averaged together. In circumstances in which rates to a group of consumers are less than the cost of providing their service using efficiently priced UNEs, it is

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[18] Local Competition Order, paras. 764-5.

the case that entry to serve those consumers will be discouraged. However, there is a similar disincentive for CLECs to enter by provision of their own facilities-based service. Thus, in a market with averaged retail rates, inefficient facilities investment is not encouraged by an efficient disaggregated UNE price.

However, if dissimilar UNE costs were instead averaged into a uniform price, inefficient investment would be encouraged. In lower-cost areas, entrants would have incentives to construct their own facilities, duplicating ILEC assets, rather than to lease UNEs at prices above efficient costs.

Distortions caused by averaging of retail rates need to be addressed by modifying the retail price structure. Creating additional pricing distortions by averaging highly dissimilar costs of UNEs would distort investment decisions.